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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant: Khurram Muhammad, Et. al.

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Examiner: TBD

Filed: 03/15/2002

Art Unit: 2819

For: Digitally Controlled Analog RF Filtering In Subsampling  
Communication Receiver Architecture Conf. No.: 2661TRANSMITTAL OF FORMAL DRAWINGS

April 30, 2002

Assistant Commissioner For Patents  
Attn: Official Drafts Person  
Washington, DC 20231

## MAILING CERTIFICATE UNDER 37 C.F.R. § 1.8(a)

I hereby certify that the above correspondence is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner For Patents, Washington, DC 20231.

Elizabeth Austin

5-1-2002  
Date

Dear Sir:

Submitted herewith are 17 sheets of formal drawings.

The enclosed drawings are being provided in a timely manner therefore no additional fee is necessary.

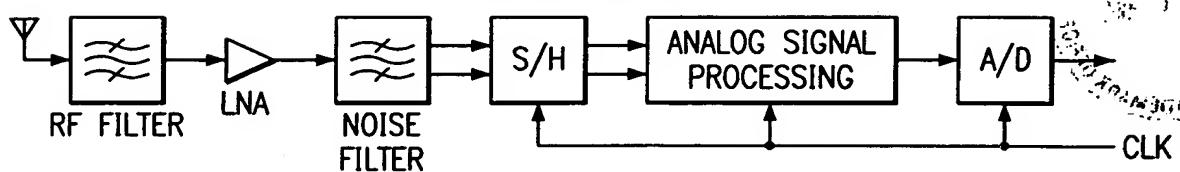
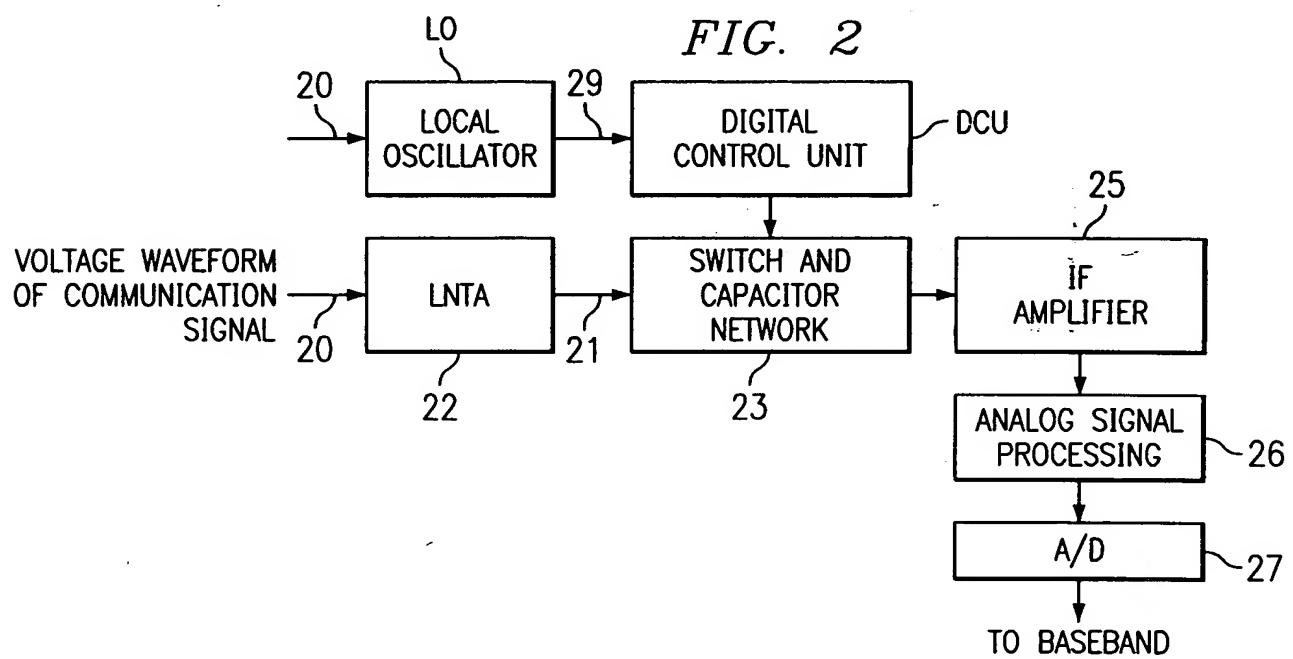
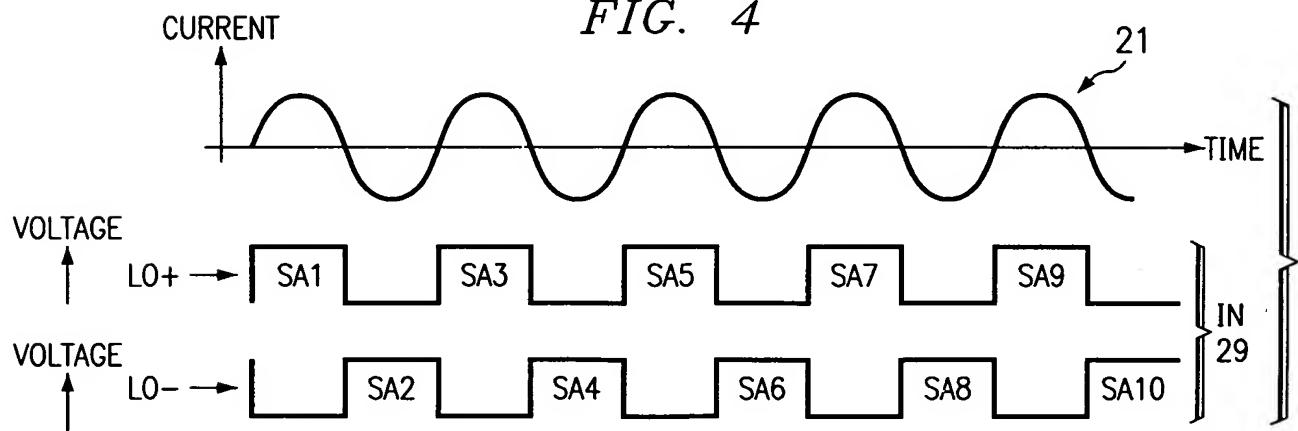
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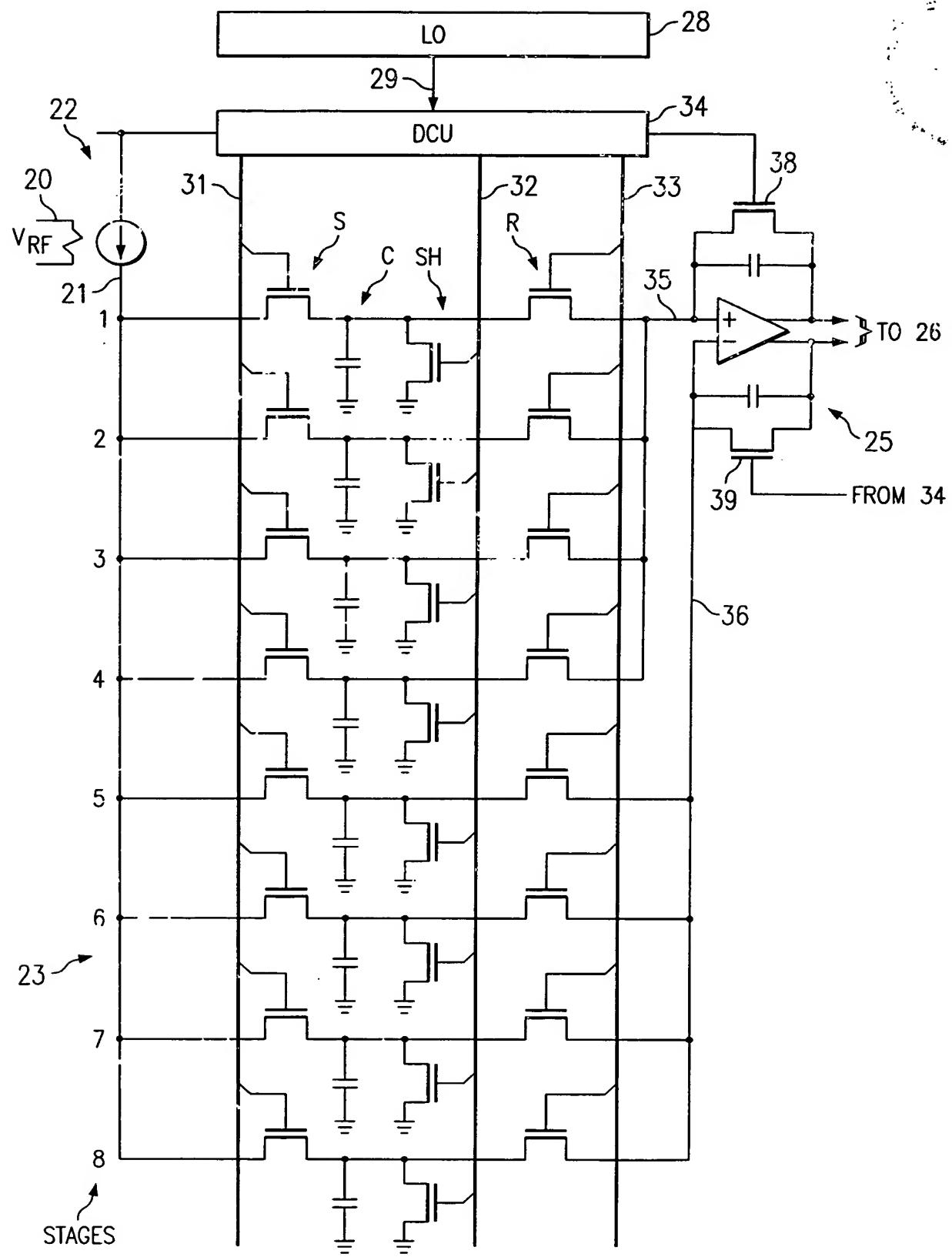
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*FIG. 1  
(PRIOR ART)*

*FIG. 2**FIG. 4*

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FIG. 3



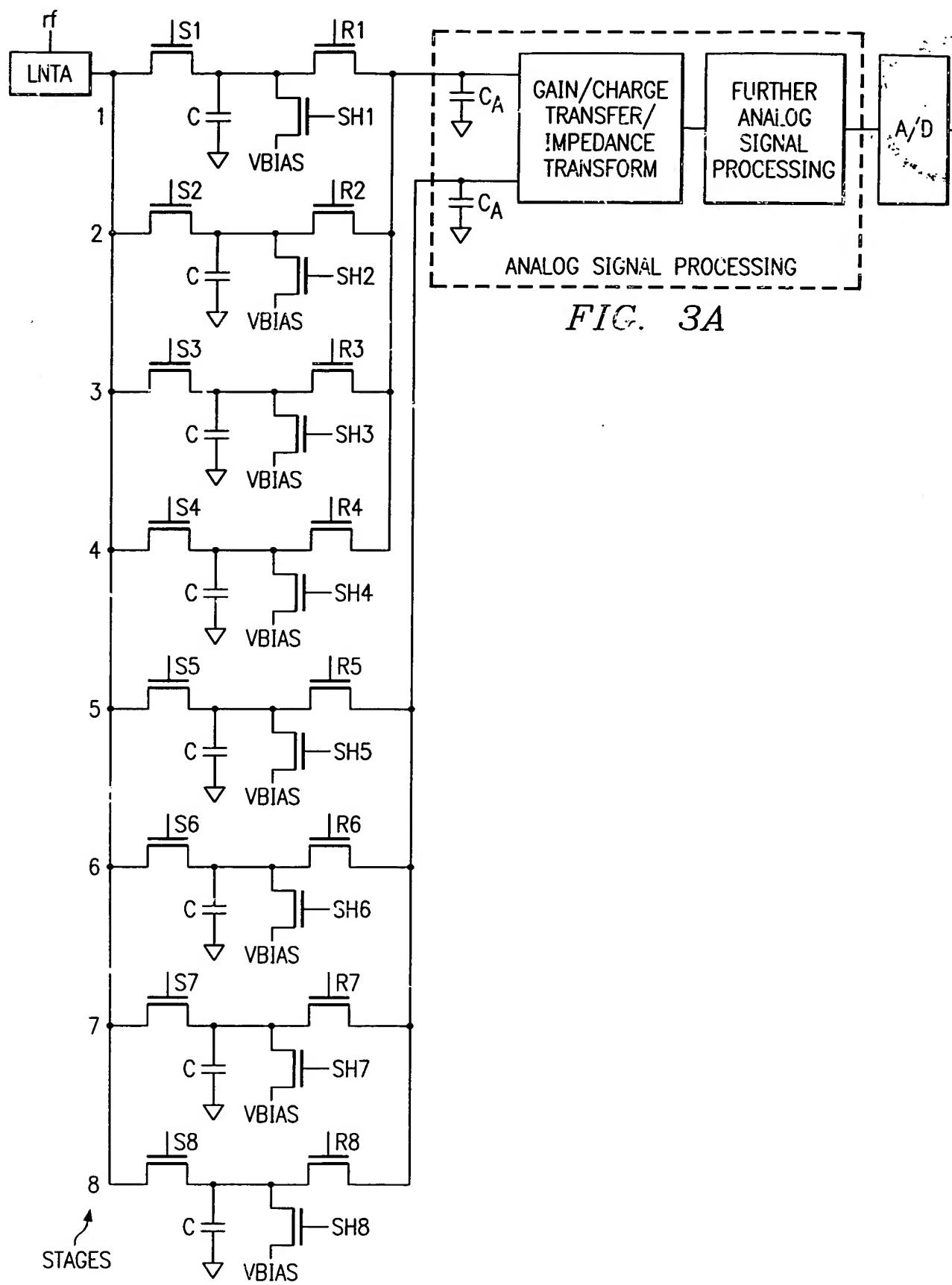


FIG. 3A

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FIG. 5

SAMPLE	SWITCHES CLOSED
SA1	S1 AND R8
SA2	S5 AND R1
SA3	S2 AND R5
SA4	S6 AND R2
SA5	S3 AND R6
SA6	S7 AND R3
SA7	S4 AND R7
SA8	S8 AND R4
SA9	S1 AND R8
SA10	S5 AND R1
SA11	S2 AND R5
:	:
:	:

FIG. 5A

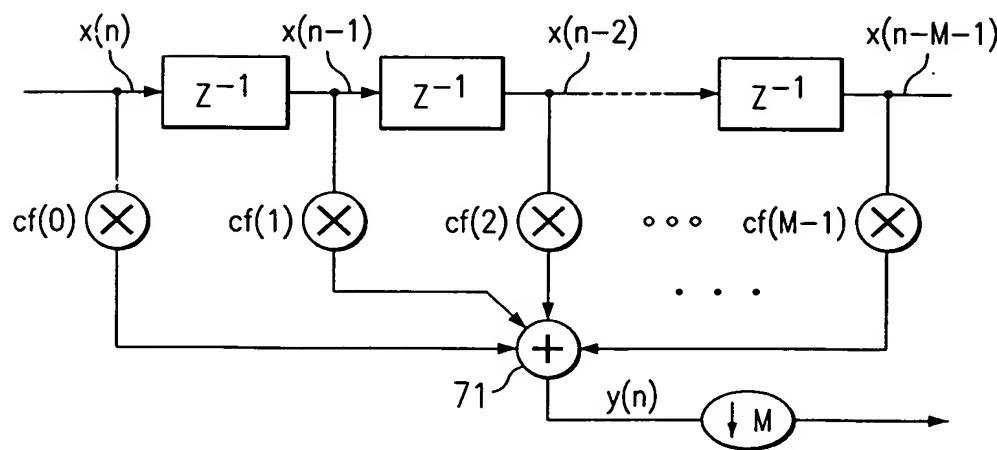
SAMPLE	SWITCHES CLOSED FOR SAMPLING	SWITCHES CLOSED FOR READ OUT
SA1	S1	R3,R4,R7,R8
SA2	S5	-do-
SA3	S2	-do-
SA4	S6	-do-
SA5	S3	R1,R2,R5,R6
SA6	S7	-do-
SA7	S4	-do-
SA8	S8	-do-
SA9	S1	R3,R4,R7,R8
SA10	S5	-do-
:	:	:
:	:	:

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FIG. 6

SAMPLE	SWITCHES CLOSED
SA1	S1 AND R4 AND R8
SA2	S5 AND R8
SA3	S1
SA4	S5 AND R1
SA5	S2 AND R1 AND R5
SA6	S6 AND R5
SA7	S2
SA8	S6 AND R2
SA9	S3 AND R2 AND R6
SA10	S7 AND R6
SA11	S3
SA12	S7 AND R3
SA13	S4 AND R3 AND R7
SA14	S8 AND R7
SA15	S4
SA16	S8 AND R4
SA17	S1 AND R4 AND R8
SA18	S5 AND R8
SA19	S1
SA20	S5 AND R1
SA21	S2 AND R1 AND R5
:	:
:	:

FIG. 7



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FIG. 6A

SAMPLE	SWITCHES CLOSED FOR SAMPLING	SWITCHES CLOSED FOR READ OUT
SA1	S1	R3,R4,R7,R8
SA2	S5	-do-
SA3	S1	-do-
SA4	S5	-do-
SA5	S2	-do-
SA6	S6	-do-
SA7	S2	-do-
SA8	S6	-do-
SA9	S3	R1,R2,R5,R6
SA10	S7	-do-
SA11	S3	-do-
SA12	S7	-do-
SA13	S4	-do-
SA14	S8	-do-
SA15	S4	-do-
SA16	S8	-do-
SA17	S1	R3,R4,R7,R8
SA18	S5	-do-
SA19	S1	-do-
SA20	S5	-do-
:	:	:
:	:	:

FIG. 8

 $(1/2)x(n)+(1/2)x(n-1)$ 

SAMPLE	SWITCHES CLOSED
SA1	S1,S2,R4 AND R7
SA2	S5,S6,R1 AND R8
SA3	S3,S4,R2 AND R5
SA4	S7,S8,R6 AND R3
SA5	S1,S2,R4 AND R7
SA6	S5,S6,R8 AND R1
SA7	S3,S4,R2 AND R5
SA8	S7,S8,R6 AND R3
:	:
:	:

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FIG. 8A

SAMPLE	SWITCHES CLOSED FOR SAMPLING	SWITCHES CLOSED FOR READ OUT
SA1	S1	R5',R6,R7,R8'
SA2	S9	-do-
SA3	S2	-do-
SA4	S10	-do-
SA5	S3	R7',R8,R1,R2'
SA6	S11	-dc-
SA7	S4	-do--
SA8	S12	-do-
SA9	S5	R1',R2,R3,R4'
SA10	S13	-do-
SA11	S6	-do-
SA12	S14	-do-
SA13	S7	R3',R4,R5,R6'
SA14	S15	-do-
SA15	S8	-do-
SA16	S16	-do-
SA17	S1	R5',R6,R7,R8'
SA18	S9	-do-
SA19	S2	-do-
SA20	S10	-do-
:	:	:
:	:	:

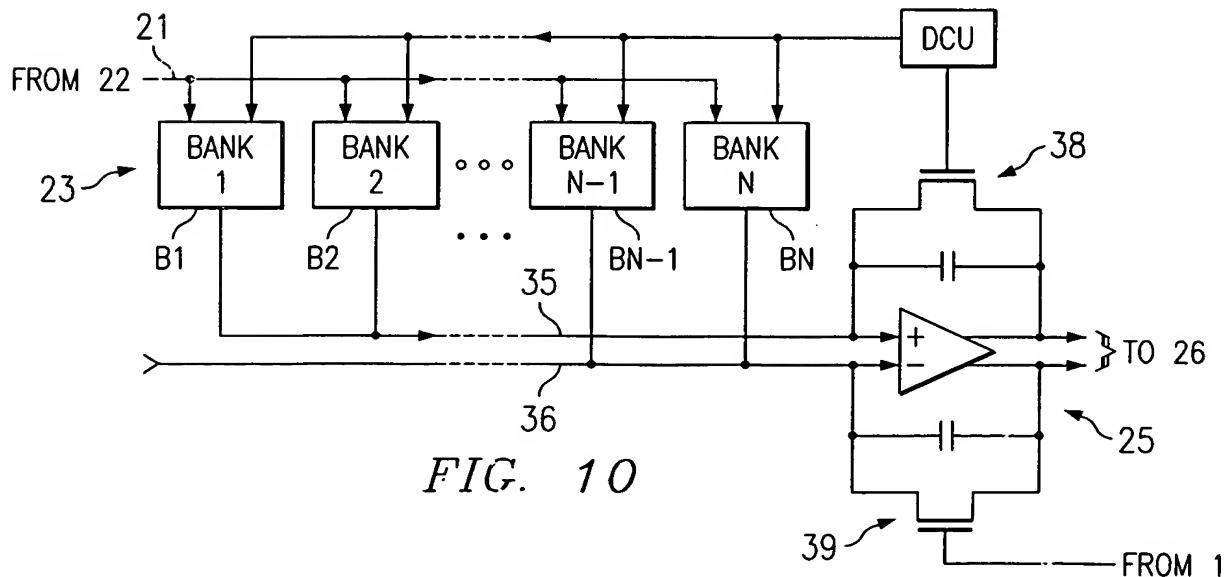
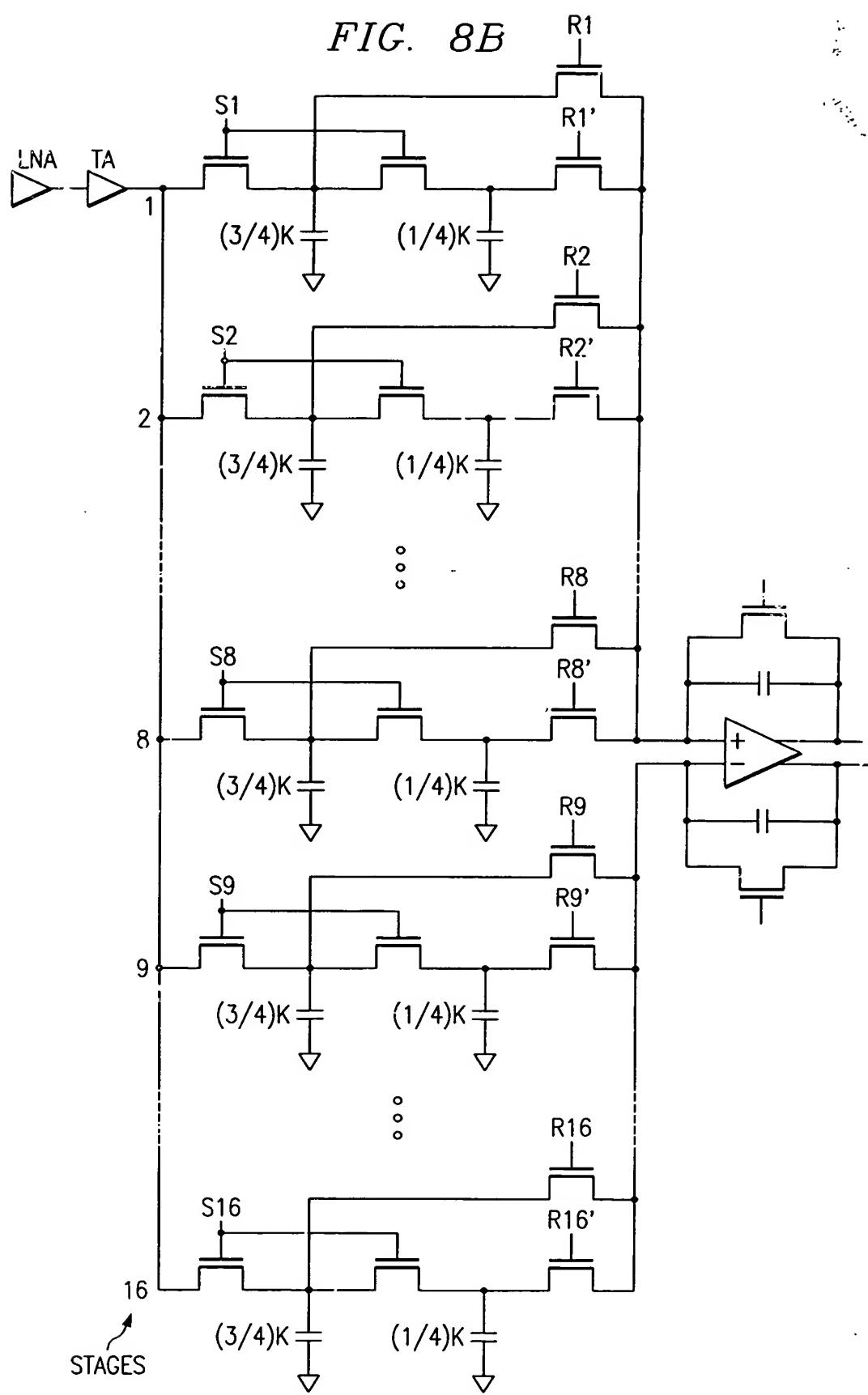


FIG. 10

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FIG. 8B



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FIG. 9

FROM 34

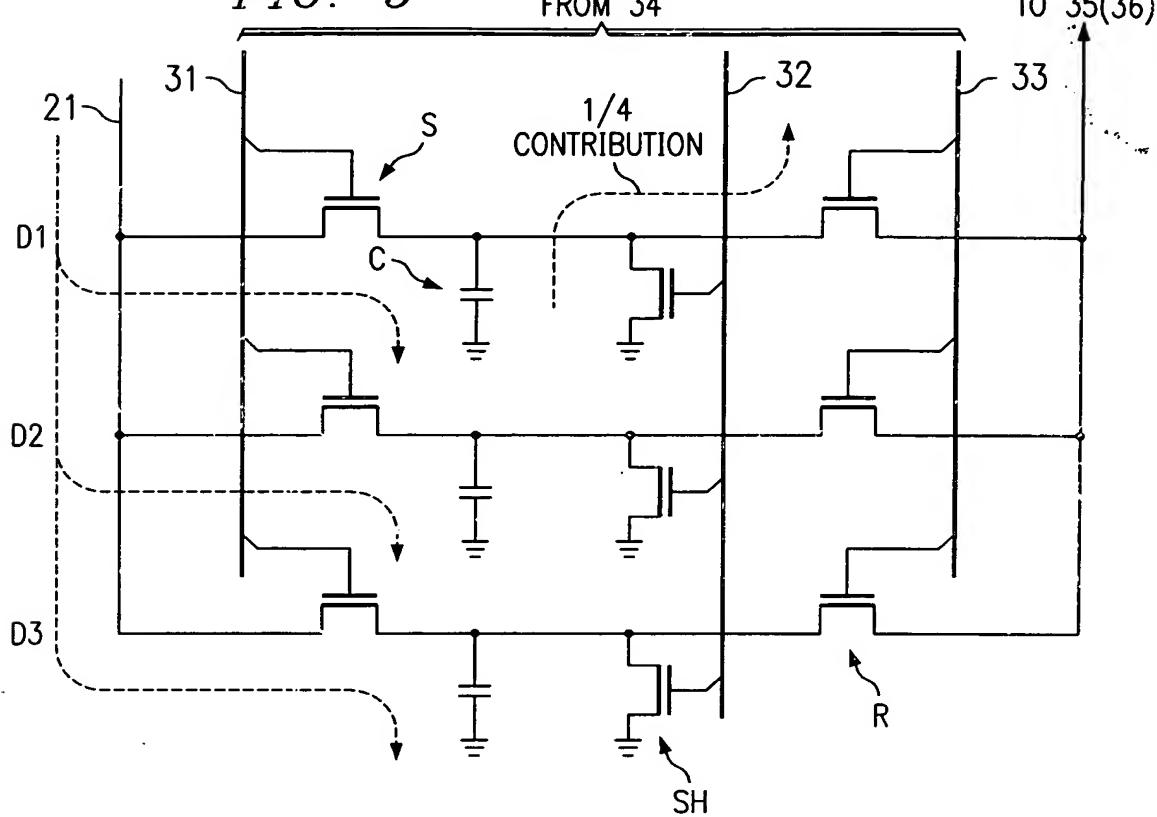


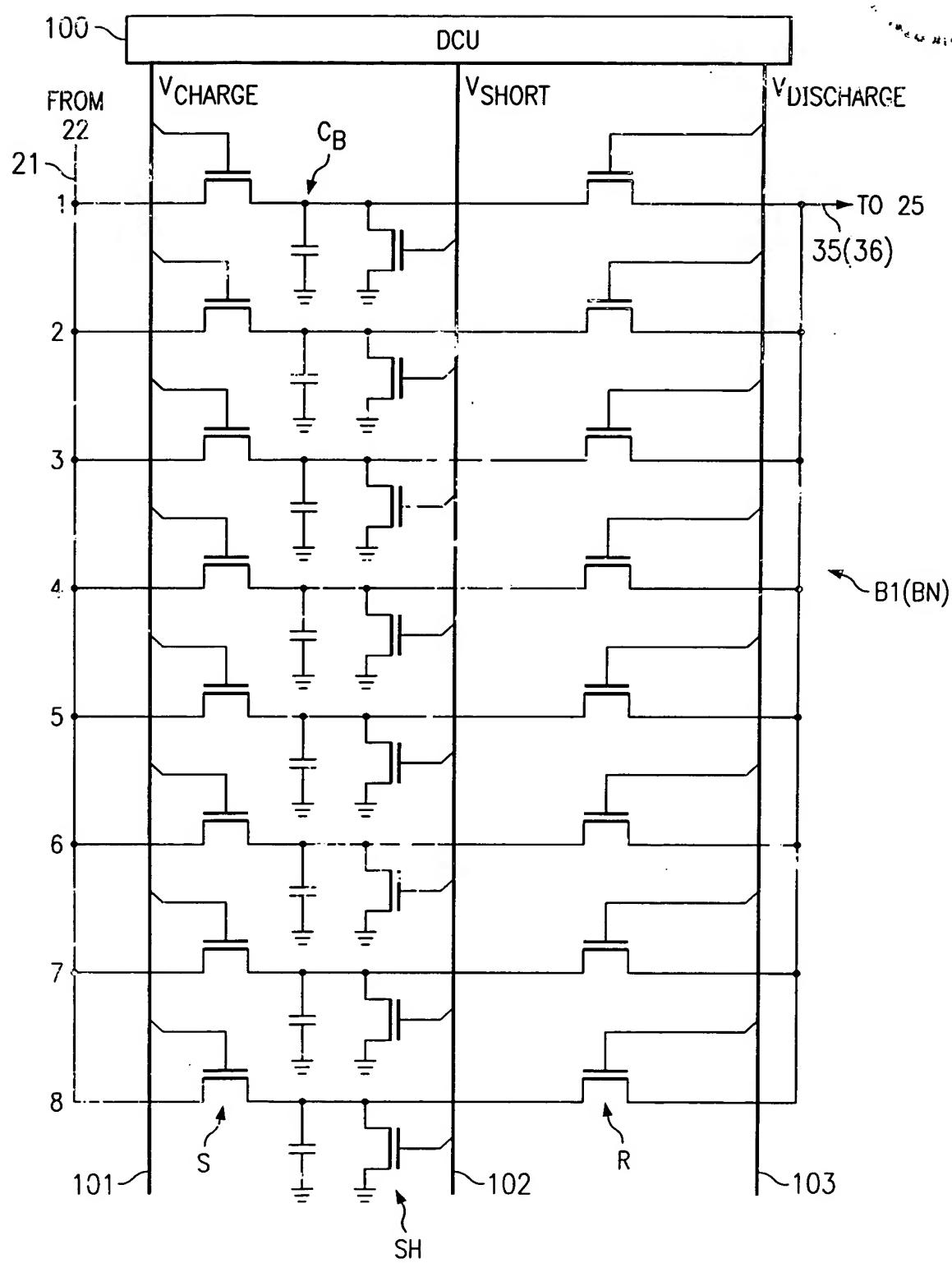
FIG. 12

SAMPLE	S1-S8 CLOSED	R1 AND R2 CLOSED	R3 CLOSED	SH1-SH8 CLOSED
SA1	B1	—	—	—
SA2	B5	B1	—	—
SA3	B2	B5	B1	—
SA4	B6	B2	B5	B1
SA5	B3	B6	B2	B5
SA6	B7	B3	B6	B2
SA7	B4	B7	B3	B6
SA8	B8	B4	B7	B3
SA9	B1	B8	B4	B7
SA10	B5	B1	B8	B4
SA11	B2	B5	B1	B8
SA12	B6	B2	B5	B1
⋮	⋮	⋮	⋮	⋮

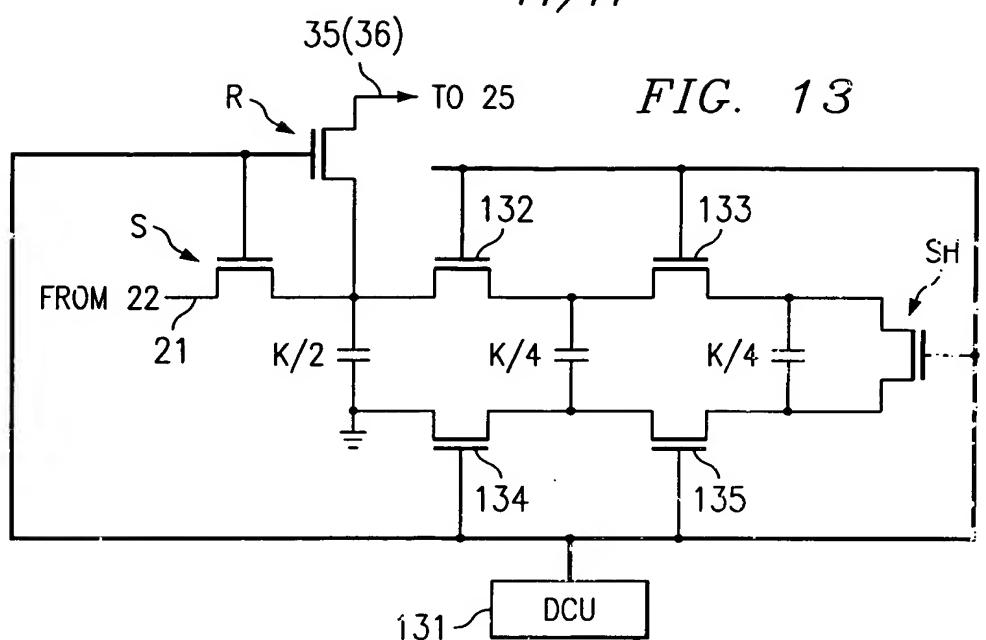
$$(1/4)x(n) + (1/8)x(n-1)$$

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FIG. 11



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B1(BN)

*FIG. 15**FIG. 14*

- 141 ~ TRANSFORM VOLTAGE WAVEFORM INTO CURRENT WAVEFORM
- 142 ~ USE CAPACITORS TO INTEGRATE SAMPLES OF CURRENT WAVEFORM
- 143 ~ PERFORM ANALOG SIGNAL PROCESSING (e.g. FILTERING) ON THE INTEGRATED SAMPLES

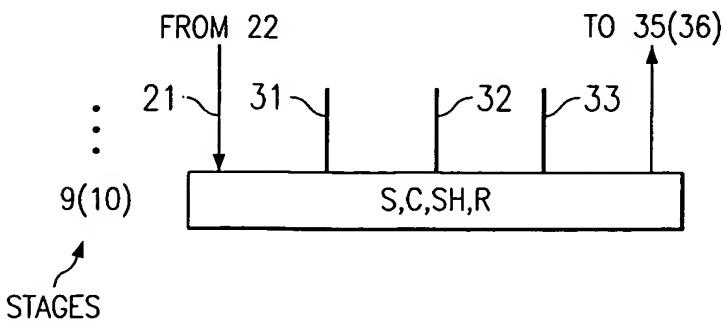
FIG. 15A

FIG. 15B

*FIG. 17*

FIG. 17A

FIG. 17B

*FIG. 16*

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FIG. 15A

SAMPLE	SWITCHES CLOSED
SA1	S1
SA3	S2
SA5	S3
SA7	S1
SA9	S2
SA11	S3
SA13	S1
SA15	S2
SA17	S3
SA19	S4 AND R1
SA21	S2 AND R1
SA23	S3 AND R1
SA25	S4 AND R1
SA27	S2 AND R1
SA29	S3 AND R1
SA31	S4 AND R1
SA33	S2 AND R1
SA35	S3 AND R1
SA37	S4 AND R2
SA39	S1 AND R2
SA41	S3 AND R2
SA43	S4 AND R2
SA45	S1 AND R2
SA47	S3 AND R2
SA49	S4 AND R2
SA51	S1 AND R2
SA53	S3 AND R2
SA55	S4 AND R3
SA57	S1 AND R3
SA59	S2 AND R3
SA61	S4 AND R3
SA63	S1 AND R3
SA65	S2 AND R3
SA67	S4 AND R3
SA69	S1 AND R3
SA71	S2 AND R3
SA73	S3 AND R4
SA75	S1 AND R4
SA77	S2 AND R4
SA79	S3 AND R4
SA81	S1 AND R4
SA83	S2 AND R4
SA85	S3 AND R4
SA87	S1 AND R4
SA89	S2 AND R4

FIG. 15B

SA91	S3 AND R1
SA93	S4 AND R1
SA95	S2 AND R1
SA97	S3 AND R1
SA99	S4 AND R1
SA101	S2 AND R1
SA103	S3 AND R1
SA105	S4 AND R1
SA107	S2 AND R1
SA109	S3 AND R2
SA111	S4 AND R2
SA113	S1 AND R2
SA115	S3 AND R2
SA117	S4 AND R2
SA119	S1 AND R2
SA121	S3 AND R2
SA123	S4 AND R2
SA125	S1 AND R2
SA127	S2 AND R3
SA129	S4 AND R3
SA131	S1 AND R3
SA133	S2 AND R3
SA135	S4 AND R3
SA137	S1 AND R3
SA139	S2 AND R3
SA141	S4 AND R3
SA143	S1 AND R3
SA145	S2 AND R4
SA147	S3 AND R4
SA149	S1 AND R4
SA151	S2 AND R4
SA153	S3 AND R4
SA155	S1 AND R4
SA157	S2 AND R4
SA159	S3 AND R4
SA161	S1 AND R4
SA163	S2 AND R1
SA165	S3 AND R1
SA167	S4 AND R1
⋮	⋮

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FIG. 17A

SAMPLE	SWITCHES CLOSED
SA1	S1
SA3	S2
SA5	S3
SA7	S1
SA9	S2
SA11	S3
SA13	S1
SA15	S2
SA17	S3
SA19	S4 AND R1
SA21	S2 AND R1
SA23	S3 AND R1
SA25	S4 AND R1
SA27	S2 AND R1
SA29	S3 AND R1
SA31	S4 AND R1
SA33	S2 AND R1
SA35	S3 AND R1
SA37	S4 AND R2
SA39	S1 AND R2
SA41	S3 AND R2
SA43	S4 AND R2
SA45	S1 AND R2
SA47	S3 AND R2
SA49	S4 AND R2
SA51	S1 AND R2
SA53	S3 AND R2
SA55	S4
SA57	S1
SA59	S2
SA61	S4
SA63	S1
SA65	S2
SA67	S4
SA69	S1
SA71	S2
SA73	S9 AND R3 AND R4
SA75	S1 AND R3 AND R4
SA77	S2 AND R3 AND R4
SA79	S9 AND R3 AND R4
SA81	S1 AND R3 AND R4
SA83	S2 AND R3 AND R4
SA85	S9 AND R3 AND R4
SA87	S1 AND R3 AND R4
SA89	S2 AND R3 AND R4

FIG. 17B

SA91	S9 AND R1
SA93	S4 AND R1
SA95	S2 AND R1
SA97	S9 AND R1
SA99	S4 AND R1
SA101	S2 AND R1
SA103	S9 AND R1
SA105	S4 AND R1
SA107	S2 AND R1
SA109	S9 AND R2
SA111	S4 AND R2
SA113	S1 AND R2
SA115	S9 AND R2
SA117	S4 AND R2
SA119	S1 AND R2
SA121	S9 AND R2
SA123	S4 AND R2
SA125	S1 AND R2
SA127	S2
SA129	S4
SA131	S1
SA133	S2
SA135	S4
SA137	S1
SA139	S2
SA141	S4
SA143	S1
SA145	S2 AND R4 AND R9
SA147	S3 AND R4 AND R9
SA149	S1 AND R4 AND R9
SA151	S2 AND R4 AND R9
SA153	S3 AND R4 AND R9
SA155	S1 AND R4 AND R9
SA157	S2 AND R4 AND R9
SA159	S3 AND R4 AND R9
SA161	S1 AND R4 AND R9
SA163	S2 AND R1
SA165	S3 AND R1
SA167	S4 AND R1
⋮	⋮

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FIG. 18

SAMPLES	SWITCHES CLOSED
SA1,SA3,...SA17	S1
SA19,SA21,...SA35	S2 AND R1
SA37,SA39,...SA53	S3 AND R1,R2
SA55,SA57,...SA71	S4
SA73,SA75,...SA89	S1 AND R2,R3,R4
SA91,SA93,...SA107	S2 AND R1,R3,R4
SA109,SA111,...SA125	S3 AND R1,R2,R4
SA127,SA129,...SA143	S4
SA145,SA149,...SA161	S1 AND R2,R3,R4
⋮	⋮

IN 26

FIG. 21

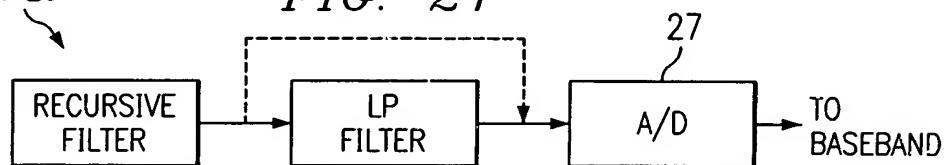


FIG. 22

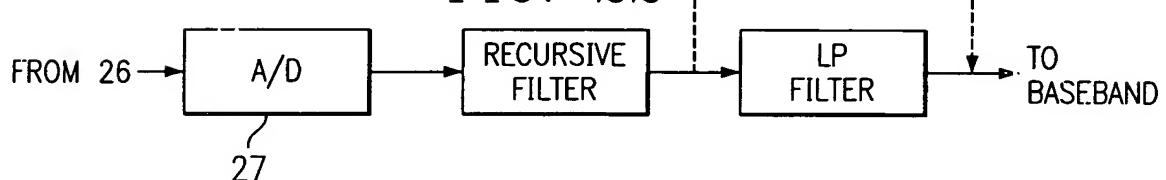


FIG. 24

SAMPLES	SWITCHES CLOSED
SA1,SA3,...,SAJ-1	S1
SA2,SA4,...,SAJ	S2
SAJ+1,...,SA2J-1	S3 AND R1 AND R2
SAJ+2,...,SA2J	S4 AND R1 AND R2
SA2J+1,...,SA3J-1	S1 AND R3 AND R4
SA2J+2,...,SA3J	S2 AND R3 AND R4
SA3J+1,...,SA4J-1	S3 AND R1 AND R2
⋮	⋮

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FIG. 19

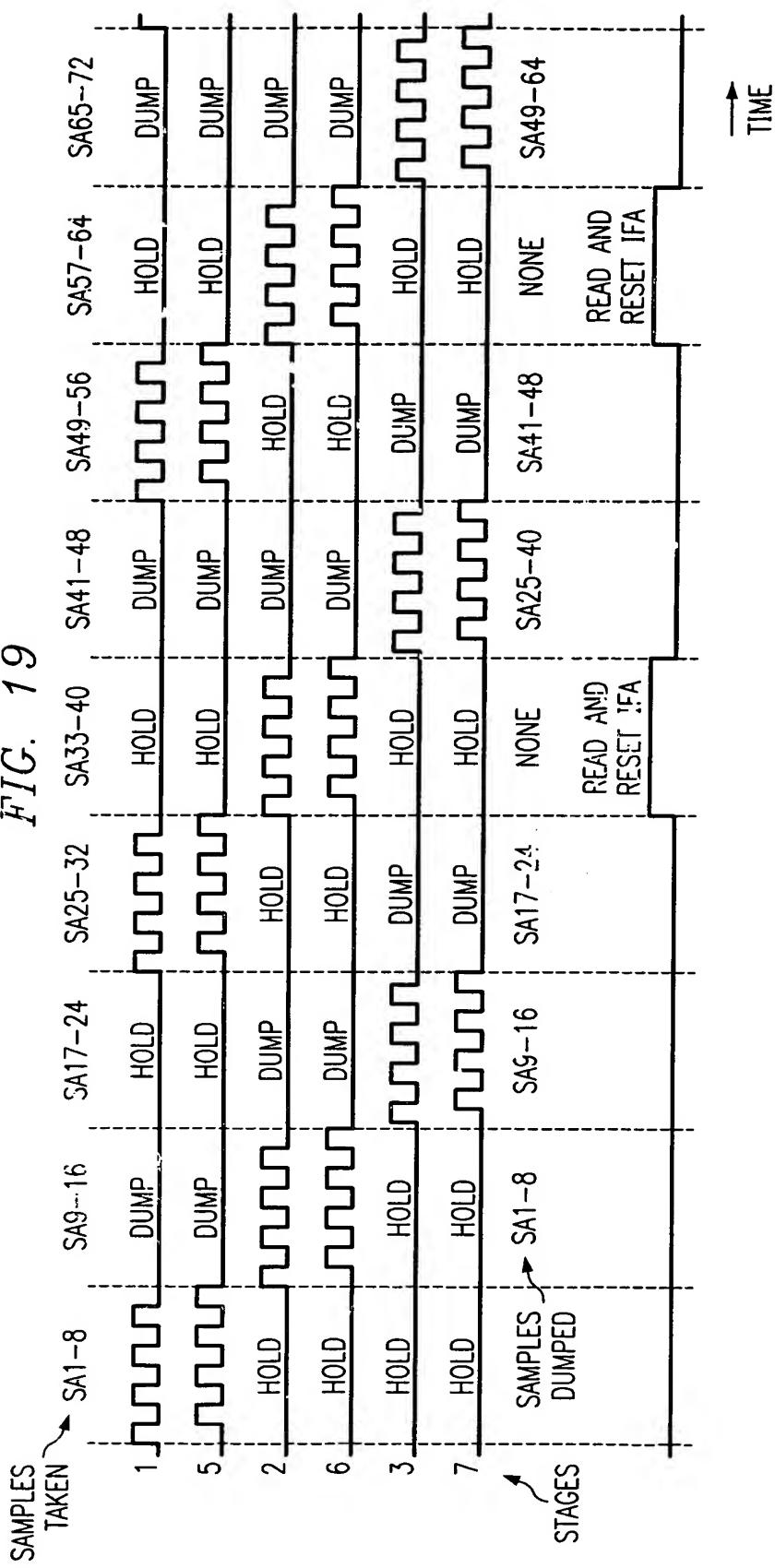


FIG. 20

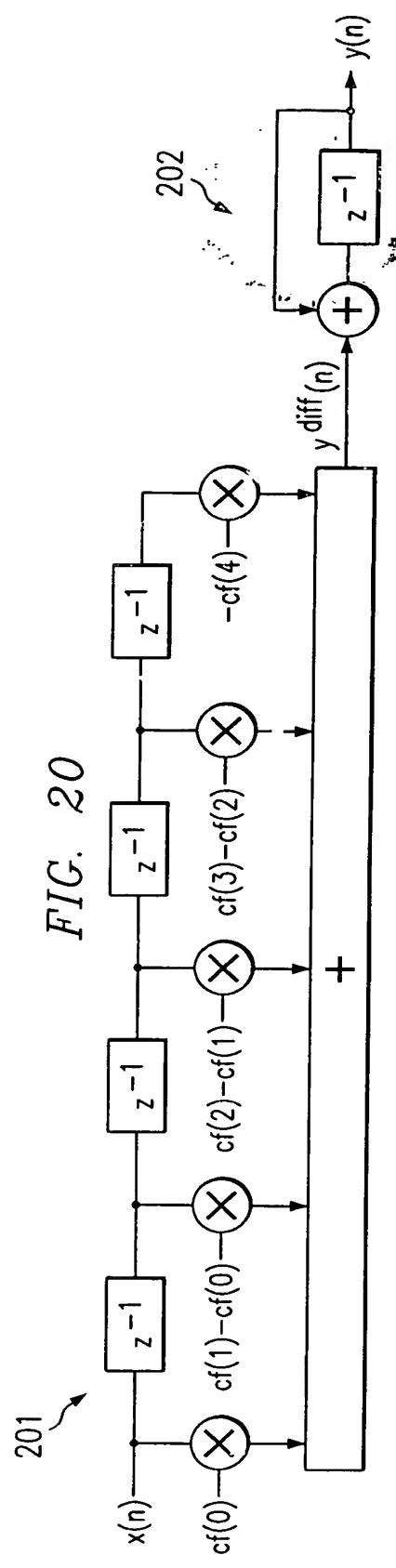


FIG. 23

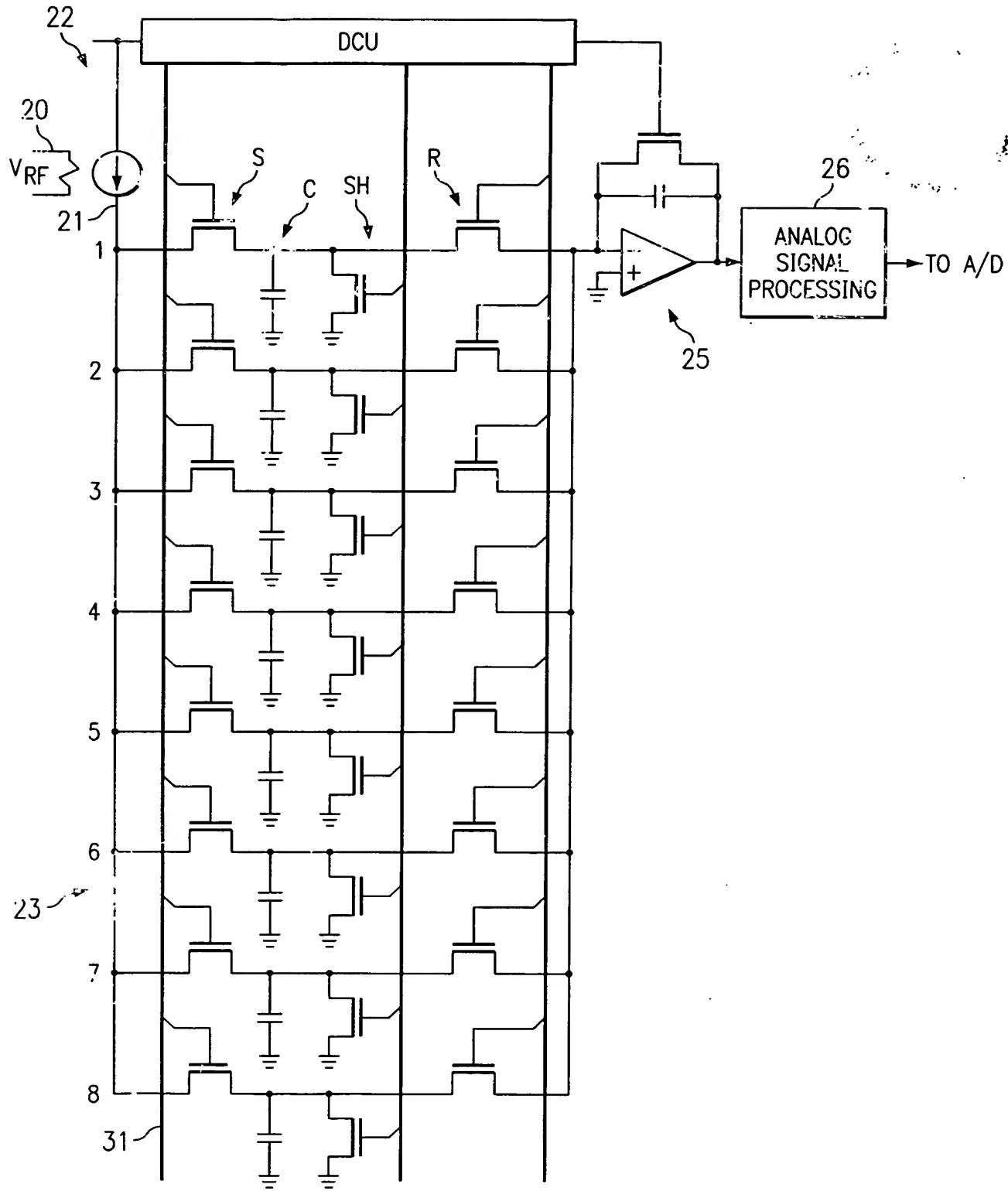


FIG. 25

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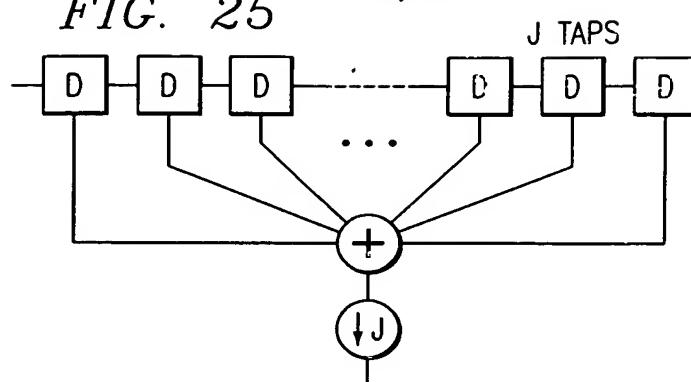


FIG. 26

